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PEACH MILDEW

By O. B. WHIPPLE

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PEACH MILDEW.

By O. B. WHIPPLE.

The phenomenal growth of the peach industry in that part of Colorado west of the Continental Divide is due, to a certain extent, at least, to the absence of insect pests and fungus diseases. While it is probable that our growers will never have the large array of these pests, which are common in many other regions, to contend with, we cannot hope to be entirely immune from such attacks. From a business standpoint, then, we should be constantly on the lookout for anything in the nature of a pest, so that it may be studied and means devised for its control before its attacks become serious.

Peach mildew has made its appearance in a few orchards and appears to be spreading. While no great amount of damage has yet been done, some of the growers are beginning to spray their trees for the control of the disease.

It is the purpose of this Bulletin to point out the nature of the disease and describe some of the means of combating it which have been used in other states. The Experiment Station has had no opportunity as yet to conduct experiments of this kind, but there is no reason to suppose that these remedies will fail in Colorado if properly made and applied.

The injury in Colorado is due to a fungus which attacks leaves, twigs and fruit alike. It appears on the fruits while they are yet small and immature, often causing them to fall prematurely. Its first appearance is indicated by a musty or frost-like patch upon the surface. When well established, the spots become almost pure white; the color being due to the mycelium and its fruiting branches, which overrun the surface upon which the fungus establishes itself. The flesh of the fruit becomes hard under these spots and the skin takes on a brown or dead color. The appearance upon the twig is very much the same, it being very conspicuous as white blotches along the twigs; the underlying bark becoming dry and brown. Where the attack is very severe the leaves fall, the bark becomes shriveled, and the young tips often assume a curved position. It

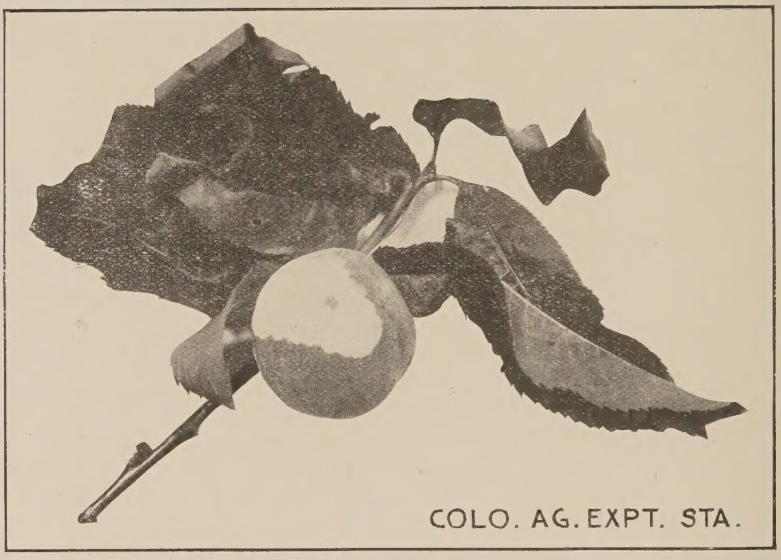

PLATE I.—SHOWING PEACH ATTACKED BY MILDEW.

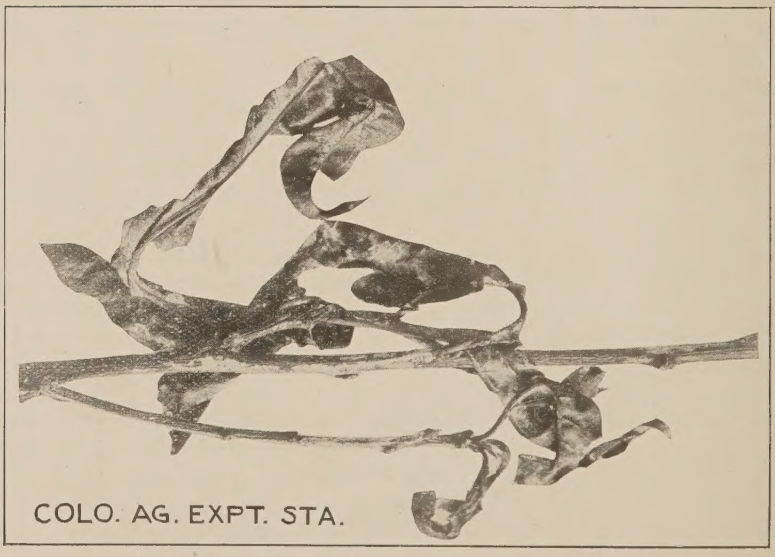

PLATE II.—PEACH TWIGS ATTACKED BY MILDEW.

only appears on the current year's growth, it being able to establish itself upon the more tender growing parts only. On the leaves, it generally appears upon the under surface, most prominently along the midrib as white, irregular blotches. The attack is not confined to the under surface of the leaf, but is found there more often, probably because strong sunlight is its worst enemy. The leaves become crimpled and curled, the younger ones near the tip often falling during severe attacks. The tissues of the leaf are deadened, and it folds more or less along the midrib, the upper surface folding upon itself.

Attacks of this fungus often injure the fruit, in some cases almost ruining the crop for market. The young twigs are checked in their growth, and sometimes killed outright, while the foliage is greatly reduced. If no injury to the crop is experienced during the season of attack it is no doubt true that the future crops and good health of the tree are at stake. Fruit buds for the coming year cannot be developed on half-dead twigs poorly nourished by a scant supply of foliage. Neither is the tree in shape to withstand other troubles to which the unhealthy peach tree falls heir.

As preventive measures, several of more or less importance can be mentioned. As the fungus thrives best in a warm, moist and shaded location, anything that will overcome these conditions might be classed as a preventive. Too close planting is not recommended, as in such plantations a free circulation of air is shut off. Pruning to an open head would no doubt be an advantage in favor of the tree. In other words, plant and prune the orchard to favor a free circulation of air and plenty of sun about and on the inside of the tree. Experience with other mildews would seem to suggest that as a preventive measure, a cool soil and location be selected. Some have recommended the planting of varieties that seem to be free from attack, but in this state little or no preference has been shown by the fungus for certain varieties. The statement has been made that the disease seemed to be restricted to the serrate, glandless-leaved varieties, but in three lots of infested material sent in to the Station by fruit growers of the state two had serrate leaves and very conspicuous glands, while the third was serrate, glandless. It has been noticed that it is especially bad on seedlings in infested localities. It seems hardly necessary to take out infested trees as some have recommended, but no doubt the seedlings above mentioned could be disposed of at little loss to the grower and may noticably check the spread of the disease.

No extensive experimental work has been followed out along the lines of determining remedies for this disease; nevertheless, knowing its habit of growth and the action of the various sprays upon the peach, no fear is entertained in recommending a system

of spraying which will no doubt prove effective in holding peach mildew in check.

In his "Fruits of California" Wickson, on the subject of combating mildew says:

"This has been effectually done by thorough sulphuring. Mr. Klee advises three applications where mildew is apt to be bad; the first one very early in the season."

Owing to the smooth surface of the foliage of the peach such applications would necessarily have to be made early in the morning or after a rain, while the foliage is damp. Though the application is generally a very simple matter when the dust sprayer is at hand, it will not, as a rule, prove as satisfactory as other methods.

Lodeman, in his "Spraying of Plants," says:

"It is probable that the disease can be held in check by spraying the trees with Bordeaux Mixture as soon as the fruit has set, and follow this at intervals of two weeks by two treatments of one ounce of carbonate of copper dissolved in ammonia and diluted with twelve gallons of water."

Peach mildew being a surface grower there is no reason why any of our standard fungicides might not be employed in fighting it. A thorough spraying, before the trees come into bloom, with formula A or C, is recommended. After the blossoms have fallen, an application of B or D should be made. Follow this at intervals of ten days or two weeks with one or two more applications of B or D. While A and E are sometimes recommended for use on the peach while the tree is in full leaf they are liable to burn the foliage more or less, and though it may not prove dangerous to the life or health of the tree, it is well to give up their use for others that are safe as well as efficient. Formula B is a modification of the regular Bordeaux mixture sometimes recommended for the peach, and can be safely used upon the peach during the growing period. Formula E is a very safe and effective spray for the first application before the leaves come out, but others given are much more simple in preparation and just as effective.

FORMULA A.—Bordeaux Mixture.
Copper sulphate (Blue stone or Blue vitriol), 4 lbs.
Quick lime ..... 4 lbs.
Water ..... 45 gal.

FORMULA B.—Copper sulphate ..... 2 lbs.
Quick lime ..... 4 lbs.
Water ..... 45 gal.

FORMULA C.—Copper sulphate ..... 1 lbs.
Water ..... 25 gal.

FORMULA D.—Copper sulphate ..... 1 lb.
Water ..... 400 gal.

FORMULA E.—Copper carbonate ..... 1 oz.
Ammonia (enough to disolve copper carbonate.)
Water ..... 12 gal.

The effectiveness of any of these sprays depends upon the

thoroughness with which it is applied, and pains should be taken to reach all parts of the tree. A nozzle that breaks up the spray well will save much time. Fresh unslacked lime only should be used. It should be slacked in water in a separate vessel diluted to a thin whitewash and strained through one or two thicknesses of burlap or sacking, or through a strainer with openings the size of a pin head, before using. This prevents the clogging of the nozzles with any of the coarse material left after slacking. The copper sulphate should be dissolved in warm water if wanted for immediate use. It may be dissolved in a considerable quantity of cold water by suspending it in a sack just beneath the surface. If to be used in large quantities it is well to make up a stock solution by dissolving fifty pounds in twenty-five gallons of water. Keep well covered to prevent evaporation. Two gallons of this solution contains the four pounds of copper sulphate called for in formula A, or one gallon contains the two pounds called for in formula B. The required amount of this solution should be diluted to at least thirty gallons before the lime water is added. The lime may be slacked in large quantities, in which condition it will keep well all summer, and the amount of lime water or paste required may be determined by a chemical test.

For this test potassium ferro-cyanide may be secured of any druggist and prepared for use by dissolving in ten times its bulk of water. A quantity of lime water is then added to the diluted copper solution, stirred well and a drop of cyanide dropped upon the surface. If it gives a reddish brown color to the mixture, more lime must be added and the test repeated until no reaction occurs. This indicates that all harmless acids of the copper have been neutralized and the mixture is ready for use. Red litmus paper may be used and lime added until the solution turns the paper to a blue color.

Bordeaux mixture deteriorates rapidly and should be used as soon as prepared. While being sprayed it requires constant stirring. In the preparation of the mixture no metal vessels or tool other than copper or brass should be used.